Service Level Management With Apdex

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Outline
- Apdex Overview
- Apdex Parameters
- Apdex Scope
- Apdex in Service Level Management
- Apdex SLM Case Studies
Apdex Defined

- Apdex is a numerical measure of user satisfaction with the performance of enterprise applications.
- It defines a method that converts many measurements into one number:
  - Uniform 0-1 scale
  - 0 = no users satisfied
  - 1 = all users satisfied
- Standardized method that is a comparable metric across:
  - Applications,
  - Measurement approaches, and
  - Enterprises

How Apdex Works

1. Define T for the application
   - T = Target time (satisfied-tolerating threshold)
   - F = 4T (tolerating-frustrated threshold)
2. Define a Report Group
3. Extract data set from existing measurements
4. Count number of samples in three zones
5. Calculate the Apdex formula
6. Display Apdex score showing T
7. Optionally display score using quality colors
Case Study: B-to-B Commerce Website

Major eCommerce site ($4B annual on-line sales)
North American broadband users accessing the San Francisco data center

This site had an average response time of 4 seconds, so it looked like all was well
But: Apdex = 0.7310 = Fair

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Process for Setting the Apdex T

Understand Application Tasks

This Webinar Covers

Determine Some T Markers

Select Initial T

Ongoing Measurements (at least 1 month)

Observe Users, Business, Events

Calculate Apdex Reports

Assess Good Vs. Bad Periods

Do Apdex and observations correlate?

Yes

Validated T & Early Apdex Score Results

No

Adjust T

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What is a T Marker?

Performance Zone Boundaries

0 T F (F = 4T)

Satisfied Tolerating Frustrated

M1 → M2

M3

A T Marker (TM) is an indicator of the user satisfied-tolerating boundary for an application

Some T Markers have a greater than or less than property

Multiple T Markers can be used to converge on an initial T value

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T Marker Alternatives

1. Default Value
2. Empirical Data
3. User Behavior Model
4. Outside References
5. Observing the User
6. Controlled Performance Experiment
7. Best Time Multiple
8. Frustration Indicator
9. Interview Stakeholders
10. Mathematical Inflection Point

Major Website Case Study: Initial T Selections

<table>
<thead>
<tr>
<th>T Markers From Three Sources</th>
<th>Initial T Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Targets</td>
<td>Measured (T Inflection)</td>
</tr>
<tr>
<td>Home</td>
<td>6.5</td>
</tr>
<tr>
<td>Search</td>
<td>2.7</td>
</tr>
<tr>
<td>My Page</td>
<td>5.8</td>
</tr>
<tr>
<td>Shopping</td>
<td>6.3</td>
</tr>
<tr>
<td>Community</td>
<td>12.4</td>
</tr>
</tbody>
</table>

Source: NetForecast
### Outline

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### Where Apdex is Applied

Applicable measurements exist in each green cell

<table>
<thead>
<tr>
<th>Task</th>
<th>Desktop</th>
<th>WAN (private or Internet)</th>
<th>Data Center Edge</th>
<th>Web Server</th>
<th>App Server</th>
<th>Database Server</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Turn</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Packet</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X (DB call)</td>
</tr>
</tbody>
</table>

Apdex is already being applied in each cell with an X
Different T Values at Each Tier

Typical Apdex T in seconds

<table>
<thead>
<tr>
<th></th>
<th>Desktop (private or Internet)</th>
<th>WAN</th>
<th>Data Center Edge</th>
<th>Web Server</th>
<th>App Server</th>
<th>Database Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task</td>
<td>2 – 12</td>
<td>2 – 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn</td>
<td></td>
<td>0.2 – 1.0</td>
<td>0.1 – 0.8</td>
<td>0.1 – 0.8</td>
<td>0.1 – 0.8</td>
<td></td>
</tr>
<tr>
<td>Packet</td>
<td></td>
<td>0.1 – 0.3</td>
<td></td>
<td></td>
<td></td>
<td>0.01 - 0.05</td>
</tr>
</tbody>
</table>

Values supplied by Apdex members

Extending Apdex Beyond Response Time

- Fundamentally Apdex is a way to present performance
  - Represented by many measurements
  - Of a service function
  - That can be grouped into 3 performance zones
- The formula can be applied to many services
  - Response Time: Packet, Turn, or Task
  - Bandwidth
  - Loss
  - Jitter
  - Other infrastructure metrics
  - Business metrics

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Apdex Applied to Bandwidth

F = T/4

Apdex = 0.95 [8]
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Performance Management Layers

- Best Practices
  - Assurance
  - Capacity
  - Availability
  - Incident
- Processes
  - Root Cause
  - MIBS
  - Diagnostics
  - Logs
  - Alarms
  - Measurements
- Tools
  - Agents
  - Discovery
  - Analytics
  - Data Storage
  - Instrumentation
  - Many More

Source: NetForecast
Service Level Management as Defined by ITIL

- **SLR – Service Level Requirement**
  - What the business needs

- **SLO – Service Level Objective**
  - Business need in IT terms

- **SLT – Service Level Target**
  - Goal in measurements of the IT terms

- **SLA – Service Level Agreement**
  - Delivery terms and conditions added

Apdex Mapped Into ITIL SLM

- **SLR – Service Level Requirement**
  - Apdex methodology defines 10+ ways to map requirements

- **SLO – Service Level Objective**
  - This is Apdex T

- **SLT – Service Level Target**
  - This is the Apdex score that you should be above

- **SLA – Service Level Agreement**
  - This is the window of time when the Apdex score matters

*Apdex T is not the SLA!*
Apdex in Each Part of ITIL SLM

Your organization will need to implement a process to work down this table

<table>
<thead>
<tr>
<th>KPI</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLR</td>
<td>From 10-ways to define T</td>
</tr>
<tr>
<td>SLO</td>
<td>Apdex T</td>
</tr>
<tr>
<td>SLT</td>
<td>Apdex Score Goal</td>
</tr>
<tr>
<td>SLA</td>
<td>Percent Score Goal is met</td>
</tr>
</tbody>
</table>

This Webinar Covered

Apdex is listed in the KPI Library
See http://kpilibrary.com/

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Case Study: Web Service Apdex Report

Not Using Apdex: Average With Threshold
Not Using Apdex: Deviation From Normal

Deviation of 50% From Normal (sec)

SLO & SLT

SLA Weekdays

Very Different SLA Compliance Reports

SLA compliance report is the percentage of days that the SLA was met
(5 states, 5 days per week, 3 weeks in the report = 75 state-days)

<table>
<thead>
<tr>
<th></th>
<th>Apdex</th>
<th>Averages</th>
<th>Deviation from Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLO</td>
<td>4 sec</td>
<td>&lt;= 4 sec</td>
<td>&gt;= 50%</td>
</tr>
<tr>
<td>SLT</td>
<td>&gt;= 0.9 Score</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>SLA</td>
<td>Weekdays</td>
<td>Weekdays</td>
<td>Weekdays</td>
</tr>
<tr>
<td>SLA Compliance</td>
<td>76%</td>
<td>88%</td>
<td>93%</td>
</tr>
</tbody>
</table>
### Case Study: e-Government Portal

#### Apdex Report Group

**Begin Date Time:** 9/1/2010 12:00 AM  
**End Date Time:** 10/1/2010 12:00 AM  
**Interval:** Hourly

<table>
<thead>
<tr>
<th>Server:</th>
<th>BusinessGroup:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACWAZ1</td>
<td>E5-All</td>
</tr>
<tr>
<td>URL:</td>
<td>Target Threshold (sec): 5</td>
</tr>
</tbody>
</table>

#### Apdex Report

<table>
<thead>
<tr>
<th>Interval</th>
<th>Apdex</th>
<th>#Page Hits</th>
<th>WAvg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0.94</td>
<td>6,447,169</td>
<td>6.29</td>
</tr>
<tr>
<td>9/1/2010 12:00 AM</td>
<td>0.85</td>
<td>220</td>
<td>7.75</td>
</tr>
<tr>
<td>9/1/2010 1:00 AM</td>
<td>0.89</td>
<td>138</td>
<td>3.17</td>
</tr>
<tr>
<td>9/1/2010 2:00 AM</td>
<td>0.81</td>
<td>90</td>
<td>4.11</td>
</tr>
<tr>
<td>9/1/2010 3:00 AM</td>
<td>0.81</td>
<td>64</td>
<td>3.92</td>
</tr>
<tr>
<td>9/1/2010 4:00 AM</td>
<td>0.81</td>
<td>51</td>
<td>3.50</td>
</tr>
<tr>
<td>9/1/2010 5:00 AM</td>
<td>0.85</td>
<td>64</td>
<td>4.72</td>
</tr>
<tr>
<td>9/1/2010 6:00 AM</td>
<td>0.84</td>
<td>33</td>
<td>10.97</td>
</tr>
<tr>
<td>9/1/2010 7:00 AM</td>
<td>0.84</td>
<td>284</td>
<td>10.78</td>
</tr>
<tr>
<td>9/1/2010 8:00 AM</td>
<td>0.85</td>
<td>321</td>
<td>6.95</td>
</tr>
<tr>
<td>9/1/2010 9:00 AM</td>
<td>0.84</td>
<td>604</td>
<td>0.83</td>
</tr>
<tr>
<td>9/1/2010 10:00 AM</td>
<td>0.84</td>
<td>671</td>
<td>7.31</td>
</tr>
<tr>
<td>9/1/2010 11:00 AM</td>
<td>0.84</td>
<td>442</td>
<td>5.18</td>
</tr>
</tbody>
</table>

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#### e-Government Portal

**Apdex Daily Report**

![Graph showing Excellent Performance, SLO, SLT, and SLA](image)

- **SLO** → **Excellent Performance**
- **SLT** → **Good Performance**

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e-Government Portal
SLA Compliance Report

SLA Summary:
The portal was not 100% compliant for any day in September
The average compliance was 70%
The trend is negative
Serious performance degradation occurred on:
- Tuesday, Sep 16
- Thursday, Sep 18
- Friday, Sep 19

Apdex Helps
Performance Management

Selection of T and the Apdex score is a link to business needs
Facilitates technologist and non-technologist communication
Defines measurement taxonomy
Encourages collaborative dialog

This Webinar Covered
- Best Practices
  - Foundation for meaningful SLAs
  - Trend analysis finds capacity problems
  - User-driven availability
  - Discovers hidden problems

Processes
- Best Practices
  - Assurance
  - Capacity
  - Availability
  - Incident

Tools
- Instruments
  - Agents
  - Discovery
  - Analytics
  - Data Storage
  - Logs
  - Alarms
  - Instrumentation
  - Many More

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Source: NetForecast
Questions and Answers

Go to www.apdex.org for more information
Join the dialog at the Apxed Exchange http://apdex.org/blog/

**Apdex Alliance Facts**

Invented: by Peter Sevcik, first articles published in Jul 2002 and Nov 2003
Alliance founded: 2004
Alliance structure: non-profit organization
Objective: Define and promote effective performance reporting methods
Technology: Open standard freely available to all
Sponsors: 27 companies since 2004
Members: 2,000 individuals interested in following and implementing Apxed